

Stage 3 Constructability Review Recommendations

Constructability reviews are intended to improve the effectiveness of a set of plans, specifications and bid documents. The plans should be clear for the contractor to be able to provide accurate bids and understand INDOT's requirements during construction.

The basic objective of the Constructability Review is to seek out overlooked problems that increase costs, impair the schedule, and decrease quality and safety margins.

The Stage 3 Review is conducted jointly by the Project Manager and the Construction Manager to achieve the best bid package.

Stage 3 Review occurs at the Final Plan Package. The intent of the Stage 3 plans is to have the plans, special provisions and cost estimates in final form.

- Final Field Check and Constructability/Utility Conference comments have been accounted for.
- Right of Way is complete or accounted for.
- Utilities Permits and NTP have been issued or accounted for.
- If required, Railroad Permits and NTP have been issued.
- Final Construction Cost Estimate and Final Special Provisions (including all water way permits) are complete.
- Compare the cost estimate with the quantity calculations, quantity tables in the plan set, and look for any missing pay items.

Items to Review at Stage 3

- Check for conflicts between items and plans and special provisions and specifications. They should be consistent throughout.
- Check for any specification updates that might impact the item needed.
- The items used need to match the specification items.
- Watch for specialty items that have supplemental descriptions.

Stage 3 Constructability Review cont'd

Stage 3 Documents

- **Stage 3 Plans**
- **Final Field Check Meeting Minutes**
- **Constructability/Utility Review Minutes**
- **Special Provisions**
- **Permits (Environmental, Railroad, & Utility)**
- **Final Environmental Document**
- **Rule 5 Erosion Control Submission**
- **Geotechnical Investigation Report**
- **Pavement Design Approval**
- **Hazardous Materials Investigation Report**
- **Quantity Calculations**
- **Cost Estimate**
- **Transportation Management Plan**
- **Commitment Report**

Commonly Missed Items to Check

- **Pavement removal**
- **RPM removal**
- **Remove traffic signal**
- **Line removal for phasing**
- **Pavement message marking removal**
- **Pipe removal. Either include an item for this and quantify it with a table or include it in clearing or right of way.**
- **CZ units for barrier wall**
- **Mob/Demob for seeding**
- **Missed pavement marking items**
- **Road closure sign assemblies**

Other Considerations

- **A "clearing of R/W" description helps.**
- **"HMA for approaches" conflicts between specs, plans and special provisions.**
- **Sometime it is better to not have an item rather than to do a "just in case" item that is undistributed.**
- **Low quantity items can hurt us, especially if there is a "quantity basis".**
- **Usage of Message Boards is not "per day". It should be "each".**
- **The direction sign on the Detour Route Marker assemblies are left out of the plans.**
- **Barricade quantities are too low.**
- **Preformed loops rarely work into the phasing.**
- **Asphalt pavement vs. concrete: Is there enough room for construction staging for concrete pavement.**



Indiana Department of Transportation

Project Constructability Review 3

Stage 3 Plan Review Submission

Construction Manager/Project Manager

Primary DES No. _____ Contract No. _____

Route _____ District _____

Work Type _____ RFC Date _____

Project Location _____

Project Description _____

County/City/Town _____ Designer _____

Project Manager _____

Construction Manager _____ Date _____

Evaluation of Project Constructability Quality

Evaluation Criteria		Y	N	N/A	Note	Flag
CONSTRUCTABILITY						
A. Plans – Road						
*	1. Are conflicts between plans and standard drawings?					
*	2. Are control points included and match the work to existing conditions?					
*	3. Can existing drainage patterns be maintained during construction?					
*	4. Has sufficient field investigation been done to ascertain that contract work can be performed as shown on the plans?					
*	5. Current site survey (horizontal & vertical controls)?					
*	6. Soils stabilization?					
*	7. Are clearing and grubbing limits identified?					
*	8. Is the quantity of borrow shown on the plans?					
*	9. Any presence of ground water or active streams?					
*	10. Is sheeting or shoring necessary to protect roadway? If so, an item will be required.					
*	11. Do driveway/turnout grades meet allowable standards?					
*	12. Have the mitigation requirements been identified & plans developed?					

Project Constructability Review (Stage 3)

* - Item related to consultant designer evaluation

Y - Yes, N - No, NA - Not Applicable, Note - See note number, Flag - Item requires priority attention

Evaluation Criteria		Y	N	N/A	Note	Flag
*	13. If staged construction, has balance of cuts and fills been done for each stage? Are temporary stockpile locations identified on the plans, if needed?					
*	14. Are the utilities and drainage shown on the Cross sections?					
*	15. Is drainage properly controlled at the ends of structures?					
*	16. Do the pipe sizes and angles fit the existing drainage structures?					
*	17. Is there sufficient R/W to trench drainage structures?					
*	18. Are special structures required because of pipe size or number of pipes?					
*	19. Check for conflicts with existing/proposed drainage.					
B. Plans - Bridge						
*	1. Any vertical activity (i.e., pre-drilled holes for piling) required inside MSE wall area that conflict with tie backs?					
*	2. Have foundation locations been checked for ROW infringements?					
*	3. Are control points noted from project limits to project limits?					
*	4. Control points should be on both sides of a structure.					
*	5. Will caisson drilling require special measures?					
*	6. Is dewatering required?					
*	7. Has substructure been examined for scour?					
*	8. Is cofferdam required?					
*	9. Ensure that when cofferdam and pumping is an item in the contract, wet excavation is also an item. Is underwater (tremie) concrete required?					
*	10. Are there conflicts between existing foundations and proposed foundations?					
*	11. Are there drainage structures that would conflict with the bridge foundations or retaining walls?					
*	12. Is shoring required to build the structure?					
*	13. Is there enough room, both horizontal and vertical, to construct typical shoring methods between construction phases?					
*	14. Permits for overlength loads to the job feasible?					
*	15. Are truck turnaround areas available?					
*	16. Are there any limitations in erecting large (particularly long) heavy bridge members? Crane size? Crane transporting? Crane erecting positions? Costs? Project structure location?					
*	17. Does the contract require a bridge erection sequence?					
*	18. Are the details for erection, bracing or stabilization of structural members sufficient?					
*	19. Is minimum bridge vertical clearance shown on the plans?					
*	20. Is there a pour sequence shown in the plans? Can it be modified or are special circumstances described in the plans?					

Project Constructability Review (Stage 3)

* - Item related to consultant designer evaluation

Y - Yes, N - No, NA - Not Applicable, Note - See note number, Flag - Item requires priority attention

Evaluation Criteria		Y	N	N/A	Note	Flag
*	21. Is all previous repair work noted on the plans or as-built?					
*	22. Is a backfilling sequence needed on abutments or wing walls to prevent "overturn" condition?					
*	23. Does falsework over traffic provide clearance?					
*	24. If stage construction, are bridge rebar splices needed and specified how to achieve?					
*	25. Vibrator space around rebar?					
*	26. Rebar congestion at pier caps?					
*	27. Verify screed elevations and dead load camber for accuracy?					
*	28. Is there adequate room to install anchor bolts for bearing assemblies?					
*	29. Are the wingwalls too long to be supported without a pile?					
*	30. Are closure pours required for bridges with phased construction?					
*	31. Do post-tensioned elements provide enough room for the PT Jacking equipment?					
*	32. Review the pour sequence for a multi-span structure. Is it achievable?					
*	33. If steel bridge built on skew, ensure there is enough room at bearings to torque the bolts.					
*	34. Emergency/interim structural repairs been considered?					
*	35. Winter concreting?					
*	36. Can the roadway and/or structures handle the load of this piece of equipment, the paving train?					
*	37. Is bridge construction phasing consistent with road construction phasing? (horizontal & vertical)					
*	38. Does the median bridge rail on divided highways create horizontal sight distance restrictions?					
*	39. Are the details for erection, bracing or stabilization of structural members sufficient?					
*	40. Are critical dimensions given within reasonable tolerances?					
*	41. If stage construction, are bridge rebar splices needed and specified how to achieve?					
*	42. Does temporary illumination also include under bridge luminaries?					
*	43. Check sign/light foundations on bridges for utility conflicts.					
C. Pay Items						
*	1. Are pay items appropriate?					
*	2. Are pay items accurate?					
*	3. Are pay items consistent with specifications?					
*	4. Do pay items reflect scope of work?					
*	5. Missing pay items?					
*	6. Are all temporary items for maintenance of traffic included?					

Project Constructability Review (Stage 3)

* - Item related to consultant designer evaluation

Y - Yes, N - No, NA - Not Applicable, Note - See note number, Flag - Item requires priority attention

Evaluation Criteria		Y	N	N/A	Note	Flag
*	7. Are pay item descriptions sufficient?					
*	8. Are privately owned services involved? Is there a bid item for these relocations?					
*	9. Are cost estimates and unit prices appropriate for type of project and construction schedule considerations?					
*	10. Are appropriate parties involved with this review?					
*	11. Any proprietary materials specified?					
D. Quantities						
*	1. Are billed materials tables accurate?					
*	2. Are quantities reliable and verifiable?					
*	3. Are quantity estimates developed to appropriate level for this review?					
*	4. Final quantity calculations of Road and Bridge Plans should be checked for overlap as well as missing items. Examples would be fill and excavation quantities, guardrail, guardrail removal, temporary shoring, pavement removal, and MOT items.					
E. Special Provisions						
*	1. Is a degree of flexibility included in the bidding documents?					
*	2. Do special provisions reflect work to be performed?					
*	3. Do special provisions include measurement and basis of payment?					
*	4. Are any special provisions omitted?					
*	5. Are coordination and agreements with appropriate agencies/parties included?					
*	6. Are there any apparent conflicts between plans, specifications or special provisions?					
*	7. Is cross referencing between various contract documents consistent?					
*	8. Are there unique special provisions due to proposed phasing?					
*	9. Are all required permits detailed in special provisions?					
*	10. Are all permit conditions that are applicable to construction activity clearly detailed?					
*	11. Does staging cause special conditions (i.e. structural adequacy/stability)?					
*	12. Proposed adjacent contracts, restrictions, constraints identified and accounted for?					
*	13. Required lanes and closure periods clearly identified?					
*	14. Any special (unique/proprietary) materials, methods or technologies required for contract?					
*	15. Special coordination required, RR, Permits, Regulatory?					
*	16. Presence of asbestos, hazardous waste or toxic materials?					
*	17. Safety requirements, fall protection, electric lines, and other utilities, RR requirements?					

Project Constructability Review (Stage 3)

* - Item related to consultant designer evaluation

Y - Yes, N - No, NA - Not Applicable, Note - See note number, Flag - Item requires priority attention

Evaluation Criteria		Y	N	N/A	Note	Flag
*	18. Has use of proprietary items been approved?					
*	19. Are there any special construction methods or conditions that need to be described or considered?					
*	20. Are utilities to be maintained during construction? If so, are provisions in place?					
*	21. Are any substations or utility appurtenances within the construction area required to be accessed during construction? If so, have provisions been included in specs?					
*	22. Railroad protection or flagger item included in contract if needed. Has a force account with the Railroad been processed?					
*	23. Are the environmental restriction period impacts identified?					
*	24. Have Unique Special Revisions required by the construction phasing been drafted?					
*	25. Are unique Special Provisions developed as needed?					
F. Utilities and Railroad						
*	1. Are utility conflicts identified?					
*	2. Are utility relocations reasonable?					
*	3. Are there construction conflicts with underground/overhead utilities?					
*	4. Is Right-of-Way conducive to utility relocations?					
*	5. Does project phasing address utility relocation?					
*	6. Do utilities conflict with drainage?					
*	7. Utilities investigation (verification of plans, schedule, and relocations)?					
*	8. Are all known utilities indicated on plans?					
*	9. Will overhead utilities be in conflict with proposed construction and/or the use of construction equipment such as cranes or pile drivers? If so, should they be relocated?					
*	10. Identify utility drainage conflicts on plans.					
*	11. Check driveways/sidewalks for conflicts with utilities.					
*	12. Is railroad coordination in progress as required?					
G. Environmental						
*	1. Environmental restrictions period impacts have been identified?					
*	2. Are erosion and pollution control items/measures shown?					
*	3. Have all permit requirements been met?					
*	4. Are dust and noise control measures identified?					
*	5. Are provisions in plans and/or bid documents for silt fences, turbidity barriers, etc. considered?					
*	6. Will utility work impact contaminated soil? Are provisions to perform this work in the agreement?					
*	7. Are required environmental permits identified & applications drafted?					
*	8. Any Environmental active commitment instead of permits?					

Project Constructability Review (Stage 3)

* - Item related to consultant designer evaluation

Y - Yes, N - No, NA - Not Applicable, Note - See note number, Flag - Item requires priority attention

Evaluation Criteria		Y	N	N/A	Note	Flag
*	9. If contamination exists on the site, have the proper type and quantity of borings and pump tests been performed?					
*	10. If contaminated soil, are there provisions for handling/treating?					
*	11. If the work is located adjacent to a residential area or occupied building, provisions may be required to minimize the impact of noise producing activities, such as restricted work hours or temporary noise barriers.					
H. Right of Way						
*	1. Sufficient R/W available for all operations?					
*	2. Is temporary R/W for construction access identified?					
*	3. Is the Right-of-Way conducive to utility relocations?					
*	4. Is there sufficient R/W to relocate all utilities?					
*	5. Does R/W account for buried drainage features?					
*	6. Is R/W straight to allow for power pole runs without a bunch of down guys?					
I. Construction Phasing						
*	1. Are work zone widths adequate for construction equipment needs?					
*	2. Are there grade changes between phases that won't allow access to adjacent properties?					
*	3. Is there enough horizontal clearance for barriers, shoring, and construction access?					
*	4. Are there areas with restricted access?					
*	5. Are work zone widths adequate for construction equipment needs?					
*	6. Are travel lanes adequate?					
*	7. Project phasing considered drainage construction?					
*	8. Does staging cause special conditions (i.e. structural adequacy/stability)? If shoulders are required to carry traffic during stage construction, are they structurally adequate or should reconstruction be required?					
*	9. Are these grade changes between phases that won't allow access to adjacent properties?					
*	10. Do the utility relocation plans work for all phases of construction?					
*	11. Are comments from previous review adequately addressed?					
*	12. Any subdivisions or commercial/industrial areas not indicated? Conflicts with adjacent projects, if any?					
	13. Was the designer conservative in locating phase lines (horizontally) to allow the contractor greater flexibility during construction?					

Project Constructability Review (Stage 3)

* - Item related to consultant designer evaluation

Y - Yes, N - No, NA - Not Applicable, Note - See note number, Flag - Item requires priority attention

Evaluation Criteria		Y	N	N/A	Note	Flag
J. Traffic Maintenance & Traffic Management Plans						
*	1. Are lane closures reasonable for traffic volumes?					
*	2. Emergency vehicle travel through closure areas?					
*	3. "Drop offs" due to construction phasing addressed to safely maintain traffic lanes.					
*	4. Pedestrian, bicycle, ADA needs considered?					
*	5. Adequate provisions for access for pedestrians and abutting properties?					
*	6. Are location of traffic control signs, warning devices, and barricades encroaching on lanes?					
*	7. Are exits and entrances to work zones adequate and safe?					
*	8. Are lanes on which traffic is to be maintained compatible with local conditions?					
*	9. Is special access required to adjacent property?					
*	10. Is safe pedestrian access and access to business/residences provided throughout the project duration?					
*	11. Has consideration been given to depth of total pavement section (including sub-grade treatment and profile changes) for safety and access?					
*	12. Design adequate for averting delays/congestion?					
*	13. Is detour necessary for averting delays/congestion?					
*	14. Determine if there are any other projects that may be in construction along the detour route.					
*	15. Are there any RR crossings located in the proposed detour?					
*	16. Adequate turn lanes provided to avoid traffic backups?					
*	17. Does the TMP adequately address site conditions and traffic volumes?					
*	18. Does the MOT plan address adequate work area for construction operations?					
*	19. Are conflicts with other work in area of project being addressed?					
*	20. Can emergency vehicles travel through zones without delays?					
*	21. Is there adequate vertical clearance in all phases of the MOT?					
*	22. Are approach and driveway grade appropriate and has construction phasing and property owner access been considered?					
K. Schedule & Special Considerations						
	1. Letting schedule is appropriate for desired completion date					
	2. Schedule addresses other work in area or related contracts in project					
	3. Schedule addresses environmental restriction periods					
	4. Schedule addresses local events, holidays, etc.					
	5. Schedule addresses special material procurement time					

Project Constructability Review (Stage 3)

* - Item related to consultant designer evaluation

Y - Yes, N - No, NA - Not Applicable, Note - See note number, Flag - Item requires priority attention

Evaluation Criteria		Y	N	N/A	Note	Flag
6. Schedule addresses removal of hazardous materials as necessary						
7. Schedule addresses utility relocation timeline						
8. Schedule addresses railroad coordination as necessary						
9. Length of time and production rates for work reasonable?						
10. Is sequence of construction reasonable?						
11. Seasonal limits on construction operations?						
12. Utility relocation schedule reasonable?						
13. Regulatory permit restrictions?						
14. Processing of shop drawings and related approvals?						
15. Materials ordering, fabrication, and delivery requirements?						
16. Restricted hours impact on production?						
17. All necessary construction operations identified?						
18. Relationship with adjacent contracts?						
19. Impact of additional work? Costs?						
20. Time related specs – completion/milestone realistic? Costs?						
21. Night and weekend work proposed and impacts considered? Costs?						
22. Does schedule address other work in area or related contracts in project?						
23. Does schedule address environmental restriction periods?						
24. Does schedule address local events, holidays, etc.?						
25. Does schedule address special material procurement time?						
26. Does schedule address removal of hazardous materials as necessary?						
27. Does schedule address utility relocation timeline?						
28. Does schedule address railroad coordination as necessary?						
29. Are utility durations taken into account with the overall construction schedule? Is it realistic?						
30. Rail shop drawing submittals, if known require a long lead time, a note should be placed in contract indicating such.						
31. Are there any lead times for materials that need to be considered in the overall schedule of the project.						
L. Special Materials/Conditions						
* 1. Pertinent provisions and restrictions clearly indicated?						
* 2. Local conditions?						
* 3. Has the cost implications of special construction methods or conditions been considered in the project?						
* 4. How does the project affect the community?						
* 5. Are there any special events that need to be considered?						
* 6. Are there outside impacts that are pushing the overall job costs up that might be mitigated in some manner?						

Project Constructability Review (Stage 3)

* - Item related to consultant designer evaluation

Y - Yes, N - No, NA - Not Applicable, Note - See note number, Flag - Item requires priority attention

* - Item related to consultant designer evaluation

Page 9 of 10

